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HANDLING THE SOFT-CORN CROP¹

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SOFT CORN: WHAT IT IS

In the normal progress of the corn crop the plants mature some two or three weeks ahead of a killing frost. At the time of maturity the grain contains between 35 and 40 per cent of moisture. Following this there is a gradual loss of moisture from the whole plant, until at husking time the moisture content of the grain usually is about 20 per cent. In favorable seasons the moisture content will be lower and in less favorable ones higher. It is unsafe to crib corn containing more than 25 per cent of moisture without providing special but simple devices for drying it. The term "soft corn" can be applied properly to any corn that is soft and watery, in contrast to the relatively hard, dry kernels of the ears as they are cribbed under ordinary conditions.

It is the purpose of this circular to point out the different ways by which soft corn can be used or preserved. It is written from the standpoint of the conditions in the northern part of the Corn Belt and northward. Although the same underlying principles apply elsewhere, climatic conditions may make it advisable to alter the practice. Thus, the probability of warmer weather and more moisture farther south makes it more difficult to save corn in the field. On the other hand, the drier climate of the Great Plains region makes it easier to handle soft corn in any of the ways described.

¹The suggestions in this circular are based largely upon the reports of experiments from the Illinois, Iowa, Minnesota, and Nebraska agricultural experiment stations and upon the experiences of farmers as related in the farm press. The writer wishes to acknowledge his appreciation of the valuable suggestions made by specialists in the Bureaus of Plant Industry, Animal Industry, and Agricultural Economics of the Department of Agriculture.

GENERAL CONSIDERATIONS

Soft corn will vary from that which is mature but not dry to very immature and watery corn. The best way to handle a soft-corn crop will depend largely upon the degree of softness. For convenience, the following classification will be used in this discussion:

(1) Nearly mature corn. This class includes corn ranging from that which is practically mature but not dry to that which is mature and partly dry. The least mature corn in this class will be that in the hard-dough stage.

(2) Slightly immature corn. This class includes corn ranging from that which is in the soft-dough stage and slightly dented to that in the nearly mature stage.

(3) Immature corn. This class includes corn ranging from that in the roasting-ear stage to that in the slightly immature stage.

(4) Very immature corn. All corn less mature than the roasting-ear stage.

Plate I shows ears in different stages of maturity. Ears A and B are on the border between classes 2 and 3. Ears C and D are in class 2, ear C being on the border between classes 1 and 2. Ears E and F are in class 1, nearly mature, but sappy. Plate II shows the same ears after they are nearly dry.

In general, the different kinds of soft corn can be utilized to best advantage as follows: Nearly mature corn can be handled so that it will store safely and be satisfactory for feeding or for sale. The slightly immature corn will be more difficult to handle. The best of it may be made into grain that is marketable but not of good quality. The least mature may be handled so as to keep it for late feeding. The ears of the immature and very immature corn are of little value except for feeding. This corn may be saved for later feeding, either as fodder or silage.

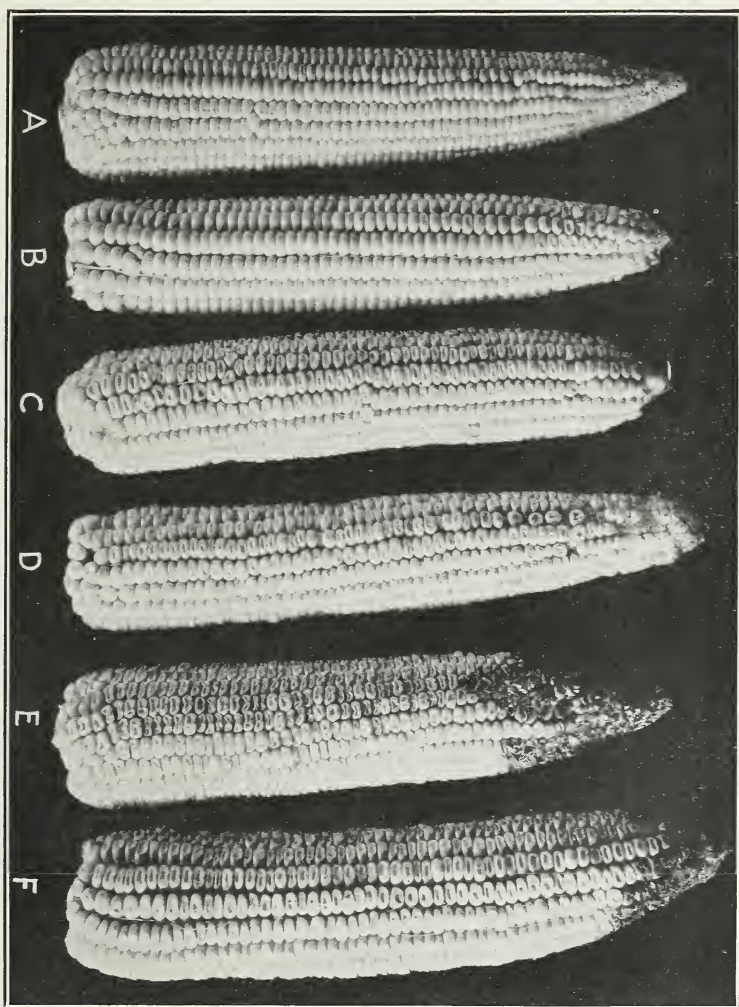
These different possibilities will be considered in connection with the different suggestions for handling.

FROSTED CORN

Corn that is frosted before it is mature should be cut immediately if the whole plant is to be fed either as fodder or silage. Leaves of frosted corn dry and break off the plant very quickly. Unless the corn is cut and in bundles before this happens, the best part of the feed is lost. Every effort, therefore, should be made to cut frosted corn to be used for fodder or silage just as soon after the frost as possible, particularly if the weather is clear and warm.

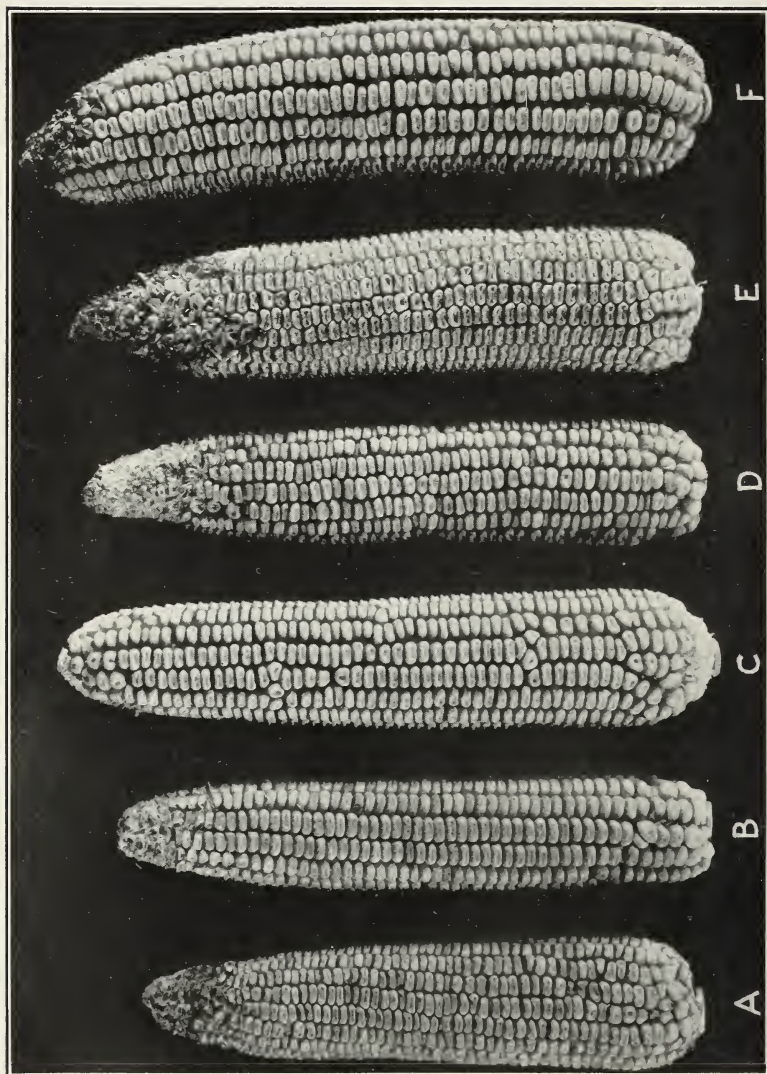
FEEDING SOFT CORN

Soft corn has about the same feeding value per pound of dry matter as mature corn and as long as it remains sound can be fed safely to all kinds of stock. Feeding soft corn should be begun carefully, however, the quantity being increased gradually to a full feed. Horses and sheep, especially lambs, are susceptible to injury from moldy corn, and such corn should not be fed to these animals. Cattle seemingly are immune from this danger, and soft corn can be fed to hogs safely as long as they will eat it. The saving of soft corn by feeding it is limited, therefore, by the number of cattle and hogs available for prompt feeding. In seasons when there is a large quantity of this corn, the demand for feeders may be so great as to make the feeding enterprise highly unprofitable. Prompt feeding



EARS OF SOFT CORN IN DIFFERENT STAGES OF MATURITY

Ears A and B are on the border between classes 2 and 3. Ears C and D are in class 2, ear C being on the border between classes 1 and 2. Ears E and F are in class 1, nearly mature, but suppy. Plate II shows the same ears after they are nearly dry



THE EARS SHOWN IN PLATE I AFTER THEY WERE NEARLY DRY

unquestionably is the best disposition to make of soft corn, so far as this is practicable.

Hogging down soft corn is a safe and satisfactory practice. When soft corn is to be hogged down the hogs must be accustomed to it very gradually. Only a little should be fed at first and the quantity increased gradually to a full feed, when the hogs may be turned into a field of soft corn to harvest it. It is advisable to give the hogs access also to a self-feeder containing tankage or fish meal, which may be placed in the cornfield.

THE SILO

The use of the silo in saving soft corn necessarily is limited, because the silo capacity of the farm generally is sufficient to handle only a small part of the crop. However, so far as they can be utilized silos afford an excellent means of saving soft corn. Moreover, there are various ways in which the capacity of the silo may be increased in effect.

WHOLE-PLANT SILAGE

The whole corn plant can be made into silage with safety while very immature. Such silage is not as valuable as that from more mature corn, because of its high water content and lower feeding value. It makes a satisfactory feed for cattle, however, and this method is one of the best for handling the immature and very immature corn. Good silage can be made from corn that has been frozen but not from corn that is moldy. Because of the rapid spoilage of corn after it has been frozen and because of its rapid loss of water it should be put into the silo as promptly as possible.

EAR-CORN SILAGE

Soft ear corn also can be made into silage. It is neither necessary nor advisable to husk the ears before ensiling, as the husks make possible better compacting in the silo. For the same reason the inclusion of a certain proportion of stalks and leaves in the silage is beneficial, particularly if the ears are quite well matured. Naturally, as the percentage of stover in the silage is increased the acreage of soft corn which can be stored in a silo of given capacity is reduced.

In making silage from soft ear corn the same principles apply as in making ordinary silage. The ears should be cut into pieces not more than 1 inch in length, and smaller pieces are better. This cut material should be packed tightly in the silo by tramping, particular attention being given to that near the walls. Usually it will be necessary to add some water to ear-corn silage. This should be added through the blower and only enough to wet the chopped corn well. The quantity of water absorbed will vary with the condition of the crop. Corn that is quite milky will require little or no added water, whereas corn in the late roasting-ear stage will require approximately 40 gallons, or somewhat less than a barrel, to a ton of ears. The last 4 to 6 feet of the silo may be filled with finely cut straw or stover to avoid the molding of the more valuable ear-corn silage below.

STACK SILAGE

According to reports from the Minnesota Agricultural Experiment Station and from Australia and elsewhere farmers without silos can

preserve green and immature corn by the stack method of making silage. The corn is cut with a binder at the same stage and in the same way that it would be for putting it into an ordinary silo. As soon as the bundles are cut they are built into a stack about 20 feet in diameter and 20 feet high. The bundles should be distributed evenly over the surface, with the butts laid to the outside. This will make the outside higher than the center, so that it is necessary to fill in the center before the stack is completed. The more thoroughly the stack is tramped down in building the better the silage will keep.

About 8 inches of the corn around the outside of such a stack will spoil. As only the butts of the stalks are affected by this, the loss is not serious. The top of the stack should be kept covered with a foot or two of hay or straw during the winter to reduce spoilage. This can be thrown back as the silage is taken off, but should be replaced after the day's feed has been removed. Heavy blankets or carpets spread over the part which is being fed off will help to protect the stack from the weather.

According to the Minnesota station, stack silage cures somewhat differently from the ordinary corn silage and has a sweet molasses odor and flavor which make it palatable to all kinds of livestock. The results obtained with stack silage have not always been satisfactory. The method is only suggested here as a possibility. Under many, if not most, conditions it would seem that handling immature corn as fodder would be safer.

CUTTING AND SHOCKING CORN

Shocking is one of the best ways to save a great part of a soft-corn crop. Under ordinary conditions in the Corn Belt nearly mature corn can stay in the shock safely until the ears are dry enough to crib, even if this takes all winter; in fact, the ears will be safer in small well-made shocks than in the crib. Fodder from very immature corn when properly cured has about the same feeding value as timothy hay.

CRIBBING SOFT CORN

If all of the stover is not needed, leave the nearly mature fields for husking from the standing stalk. There is no hurry about husking these fields. Under ordinary weather conditions soft ears are much safer on the stalk in the field until December than they are in the crib. By that time they will have dried out considerably. If it seems advisable to start husking sooner, begin slowly and scatter the corn in different cribs. With good drying weather a load of corn all of which is exposed to the air will dry a good deal in two or three days.

SORTING

Much can be accomplished by separating the soft corn from that which is sound. Even the corn within a field varies greatly in softness. One wet, immature ear stored among others that are nearly mature frequently will cause them all to rot, whereas the better ears might have remained sound had they been stored alone.

Sorting may be done in the field or after the corn is brought to the crib. In the former case the wagon box may be divided into

two parts, the softer corn being thrown into one end and the better corn into the other. If husking is being done by the bushel, it probably will be better to sort it at the crib. A platform may be built of old lumber on which the corn can be dumped for sorting. The better corn then can be handled separately and saved for sale or for late feeding, the softest being stored in temporary cribs for prompt feeding.

VENTILATION

If soft corn is to be cribbed safely, the one essential is to provide ample ventilation. Only in this way can the excess moisture be removed. The ordinary crib is planned for storing corn containing 20 to 25 per cent of moisture and is inadequate to care for that containing 35 to 45 per cent or more.

By the use of various simple ventilating devices most ordinary cribs can be adapted to care for soft corn. In the case of that containing 30 to 35 per cent of moisture there should not be more than 2 feet between any part of the corn and a free-moving current of air.

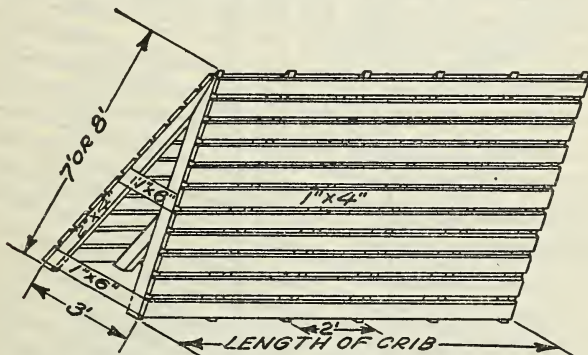


FIG. 1.—The ordinary A-shaped ventilator common in the Corn Belt. This should extend from one end of the crib to the other. Some of the crib slats should be cut away at openings to permit free circulation of air

This condition will be provided by a crib 8 or 9 feet wide with a single ventilating partition down the middle. Corn containing more moisture will require more ventilation than this. The following ventilating devices are all good. Which ones to use will depend largely upon what material is available.

The A-shaped ventilator, familiar in the Corn Belt, probably is as good a device as any. The method of constructing such a ventilator is shown in Figure 1.

The ventilating partition shown in Figure 2 is constructed by placing two parallel rows of 2 by 4 studding 6 inches or more apart so as to divide the crib into two or more sections. These are covered with 1 by 4 or 1 by 6 inch boards about 2 inches apart or with woven wire of a small enough mesh to prevent the ears from falling through.

Small ventilators may be constructed in various ways, as shown in Figure 3, and placed in the corn as the crib is being filled. They can be used best to supplement the main ventilators. Tiles placed end to end close enough together to keep the ears from falling between them also may be used as ventilators.

Pieces of dry lumber or poles placed through the corn will help to prevent its packing and will provide some ventilation. They should be covered with a little dry brush to keep the corn from settling around them. In fact, light brush may be used to divide the corn into thin layers, giving very good ventilation.

The main ventilators should always extend from one side or end of the crib to the other and should open directly into the outside air. Even the crib slats will interfere with the free movement of air through the ventilators and therefore should be cut away at the

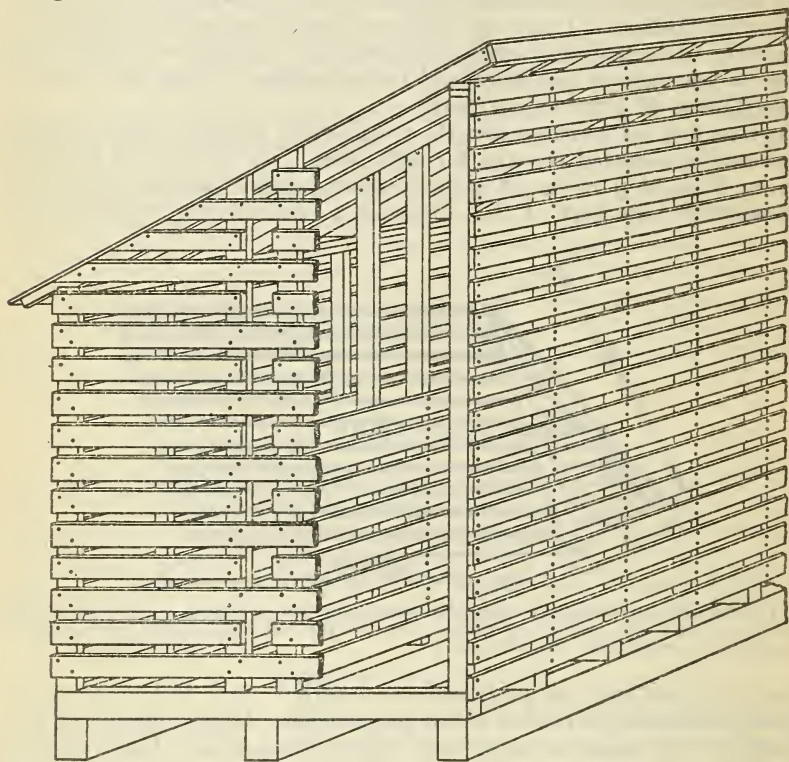


FIG. 2.—A ventilating partition, somewhat more expensive than the one shown in Figure 1, but very efficient. Woven wire may be used to cover the studding instead of the boards shown. Note that each alternate crib slat is cut away at the opening to give better circulation.

ventilator openings. Cross ventilators may open into the main ventilators at one end but should open into the outside air at the other end, as in the case of the main ventilators. It is the moving air that carries away the excess moisture. A dead-air space does no good and frequently does harm.

ARTIFICIAL DRYING

The Iowa Agricultural Experiment Station reports that soft corn can be dried economically on the farm by forcing heated air through it. The method used is shown diagrammatically in Figure 4. A single opening in the center of a square or round crib may be used.

A ventilator should be placed over this, so that the hot air will go to all sides of the crib. Rectangular cribs should be provided with conduits or pipes to carry the heated air to the different parts of the crib. These may be made from four 12-inch boards nailed together. The conduits should be about 6 inches above the bottom of the crib and provided with trapdoors along the under side. These doors should open into the conduit, so that when open the portion of the conduit farther from the heater will be closed. They can be opened and closed by wires extending above the corn. In this way the hot air can be directed to any part of the crib. If the grower has a drag pit in his corner, this may be used as a hot-air conduit.

The blower from a silage cutter may be used to force the air through the heater and corn. If such a blower is not available a regular ventilating fan operated by a small gasoline engine can be used. The size of the furnace will vary considerably with the quantity of corn to be dried and the temperature of the air. In the experiment at Ames, Iowa, the corn was 7 feet deep in a crib 12 feet in diameter. A furnace with a 28-inch grate furnished enough

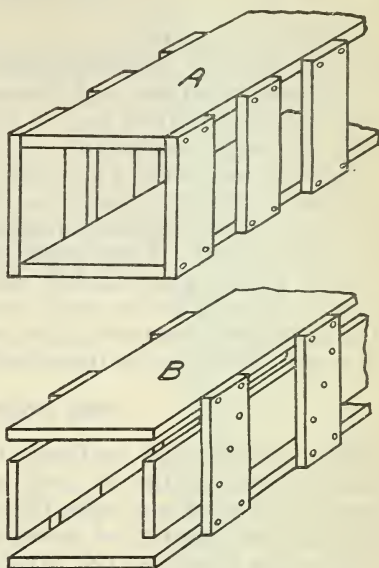


FIG. 3.—Two ways of making secondary ventilators. These may be placed lengthwise or crosswise of the crib or vertically. All ventilators should open into the outside air. A dead air space may do more harm than good

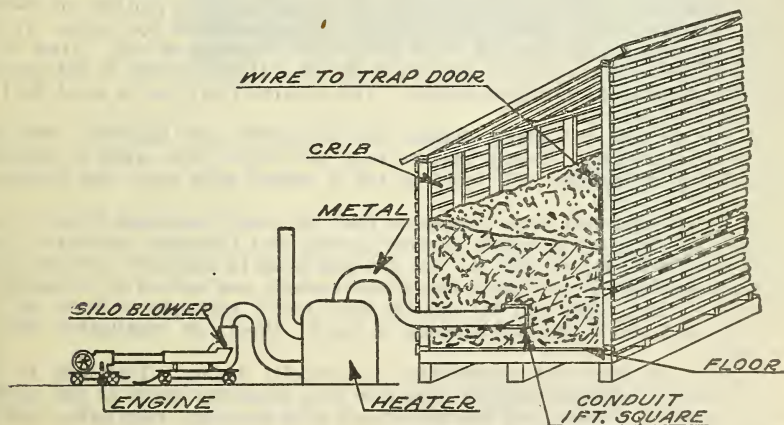


FIG. 4.—The Iowa method of drying corn artificially

heat to dry down this corn to 10½ per cent of moisture in 48 hours, with an outside temperature of about 10° below zero. The moisture in crib corn has been reduced in this way from over 20 per cent

to less than 10 per cent at a cost of from 1 to 6 cents per bushel for fuel and power. To this must be added the cost of the ventilators, furnace, etc.

SALTING SOFT CORN

Salting as a means of preserving soft corn came into prominence in the fall of 1917. Experiments by the Iowa and Illinois Agricultural Experiment Stations and observations of cribs of salted corn indicate that this method can be used to good advantage in connection with thorough ventilation.

Salting corn is not a cure-all. There is no way to keep corn sweet without getting the water out of it. Salt will tend to draw out the moisture, check the development of mold, and help to prevent heating in the crib. Then ample ventilation will dry out the corn so rapidly that a good quality will result. It is better to spread the corn uniformly in the crib and sprinkle the salt over this evenly. The standard recommendation is 8 quarts of salt for a 40-bushel load of corn. This may be increased to 12 quarts if the corn is very soft.

THE CROP AS A WHOLE

The problem that confronts the average farmer with soft corn is how best to handle the crop as a whole. Such conditions as the capacity of silos and cribs, the numbers and kinds of livestock to be fed, and the quantity of moisture in the corn, as well as whether the whole crop is soft or not, must be considered in deciding this.

The following summary brings out the points that must be kept in mind in formulating such a plan:

(1) Feeding offers the only hope of utilizing corn that is too immature to make marketable grain. Accustom your stock to soft corn as soon as possible, and begin feeding the least mature of it either by pasturing it or by cutting and feeding it. Part of it can be carried over for later feeding either as silage or fodder. Corn that is cut and shocked before the leaves drop off can be used to refill silos after the first filling has settled. In general, use the most immature corn for silage and that which is somewhat more mature for fodder.

(2) Use the nearly mature and slightly immature fields for grain. If the stover is needed also, cut the corn before the leaves are lost. After it is in the shock it is reasonably safe until spring. If the stover is not needed, let the corn stay in the field awhile. The ears will dry out a good deal in 30 days.

(3) Do not crib the nearly mature and immature corn together. Sort the ears before cribbing. Nearly mature ears will make fair grain if properly handled, but frequently will mold or rot if stored with very wet immature ears.

(4) In cribbing soft corn, remember that the most important thing is ventilation. If the corn is nearly mature, sorting and thorough ventilation may be all that is needed to save it. Do not pile it up in one crib. Scatter it as much as possible. If you think this is not enough, use salt—8 to 12 quarts to the load of corn. Salt will not dry the corn, but it will help to draw out the moisture and check the development of mold. Plenty of ventilation will do the rest.

(5) Keep in mind the possibilities of artificial drying. This may be the best method of handling slightly immature corn when the stover is not needed. It is expensive, though, and the use of salt with thorough ventilation may be just as efficient under many conditions.

(6) It makes little difference what kind of ventilators are used if you use enough of them. The only way to get the water out of soft corn is to let it evaporate. It can not do this unless moving air can get to every part of the crib.

